Metformin Lactic Acidosis

INTRODUCTION

- Lactic acidosis is a rare, but extremely serious complication of Metformin use. It is the major toxicity concern with Biguanide use and the reason why Phenphormin was removed from the US market in 1976.
- The mechanism includes the conversion of glucose to lactate in the splanchnic bed of the small intestine, as well as the inhibition of mitochondrial respiration, leading to decreased gluconeogenesis.

CASE PRESENTATION

Past Medical History:	62-year-old male with history of type 2 diabetes, CAD status post 6 stents, and essential hypertension
History of Present Illness:	Weakness; fatigue; multiple episodes of **nausea, vomiting, abdominal pain**; and **decreased urine output** for several days. **Worked on roof all day 3 days ago.**
Medications:	Amlodipine, Aspirin, Atorvastatin, Clopidogrel, and **Metformin 1000 mg b.i.d.**
Vitals and Physical exam:	Hypertensive with **moderate distress, diaphoresis**, voluntary guarding of the abdomen, but no abdominal tenderness
Initial testing:	**K+ 6.4, Lactic acid 11.7, Blood glucose 20**, **Creatinine 13.3** **ABG: pH 6.9, PCO2 25, HCO3 5** CT abdomen: negative for acute findings
Management:	Ca-gluconate 1g IV, **2 amps Bicarb + drip**, **intubation and mechanical ventilation**, and **emergent dialysis**. Led to rapid reversal of acidosis and hyperkalemia. Discharged 3 days later.

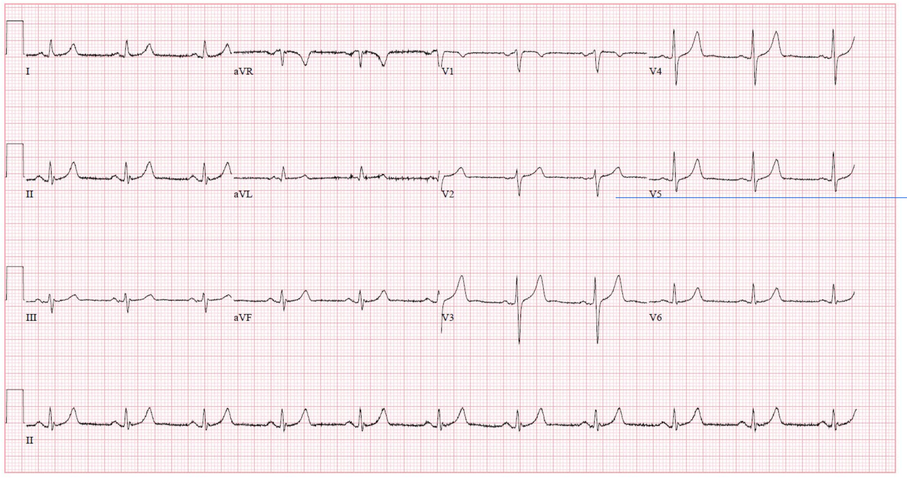
DISCUSSION

- Occurs in 4.3 cases per 100,000 patient years.
- **Mortality can be up to 45%** – best predicted by liver dysfunction

Check blood glucose, Tylenol, salicylate, EKG, beta-hCG, ABG, CMP, and lactate. **Metformin levels not needed**.

Most common in patients with hepatic insufficiency, renal failure, acute infection, alcohol use, prior lactic acidosis with Metformin, hemodynamic instability, hypoxic state, and/or severe illness.

Symptoms: nausea and vomiting most commonly; less commonly dyspnea and altered mental status



Patient's EKG demonstrating peaked T waves–a consequence of hyperkalemia in severe metabolic acidosis and acute renal failure

MANAGEMENT

- In addition to the ABCs, the acidosis must be treated with Bicarb if pH is less than 7.1, or if less than 7.2 with severe acute kidney injury (AKI).
- Tthe goal is to maintain pH above 7.1 in normal patients and more than 7.3 in those with AKI.
- **Dialysis should be used in the following cases**: Lactate 15-20 mmol/L, pH 7.1 or lower, shock, vasopressor therapy, AKI with creatinine above 2.0.
- **Metformin should be discontinued** and patients should follow up with PCP within 6 days to modify hypoglycemic therapy.

CONCLUSION

- The objective of this case report is to discuss the importance of rapid recognition of Metformin-induced lactic acidosis in patients without history of renal or hepatic failure. Proper treatment with emergent dialysis and bicarb is potentially life-saving.

- Elevated plasma metformin concentration (e.g kidney failure) or other events that interfere with lactate production or clearance, such as hepatic failure or sepsis are typically the factors that lead to Metformin-induced lactic acidosis. However, as discussed, our patient had no history of such events.

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